

***Pseudodeightoniella indica* gen. and sp. nov., a hyphomycete from India**

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ABSTRACT—An interesting new mitosporic foliicolous genus and species, *Pseudodeightoniella indica*, discovered on living leaves of *Medicago polymorpha* (*Fabaceae*) from Uttarakhand, India, is described and illustrated. Morphologically, *Pseudodeightoniella* differs from the closely similar *Deightoniella* and *Neodeightoniella* in producing well-developed erumpent stromata, highly undulate to spiral or helicoid and densely fasciculate conidiophores with enlarged basal cells, and conidia lacking mucoid caps. Recently published illustrations of conidia and conidiophores characterizing the *Deightoniella* and *Neodeightoniella* type species are also provided.

KEY WORDS—asexual fungi, biodiversity, plant disease, taxonomy

Introduction

Deightoniella S. Hughes was introduced with type species *D. africana* S. Hughes (Hughes 1952). The main diagnostic features of *Deightoniella* are mononematous brown conidiophores that are torsive or flexuous and typically nodulated or annellated by the outer wall after each enteroblastic precurent proliferation of the conidiogenous cells and obclavate to obpyriform, subhyaline to olivaceous brown, minute verruculose, transversely 1–2-septate

conidia with the septum above the median and the apical cell prominently tapering towards subobtuse apex (Hughes 1952, Klaubauf & al. 2014, Videira & al. 2017). Multigenic analysis by Klaubauf & al. (2014) placed *Deightoniella* in a new family, *Pyriculariaceae*.

Similar to *Deightoniella* is *Neodeightoniella* Crous & W.J. Swart, described in 2013 with the type species *N. phragmiticola* Crous & W.J. Swart (Crous & al. 2013). *Neodeightoniella* differs from *Deightoniella* in producing less fasciculate, straight (to slightly flexuous) sub-cylindrical conidiophores produced from a poorly developed stromata of a few brown cells; terminal and integrated conidiogenous cells; dark thickened scars; and 1-septate fusoid-ellipsoid conidia with apical cells that are globose and with prominent mucoid cap and funnel-shaped basal cells that are widest two thirds from the basal hilum before tapering prominently to a truncate, darker and thickened hilum, hilum with a central pore (Crous & al. 2013, Videira & al. 2017). Phylogenetically, *Neodeightoniella* clusters in the *Mycosphaerellaceae* (Videira & al. 2017). Fifteen *Deightoniella* and one *Neodeightoniella* species are currently accepted (www.indexfungorum.org; accessed 15 August 2020).

During the past decade, several asexual foliicolous fungi have been described from north India (Awasthi & al. 2016; Kumar & Singh 2015a,b, 2016; Kumar & al. 2012a,b, 2018; Kushwaha & al. 2020; Singh & Kamal 2011; Singh & al. 2011, 2012, 2013a,b, 2014a,b, 2019), suggesting that such fungi are highly diverse and in need of additional exploration and characterization. During a systematic survey of conidial fungi in the forests of Nainital, Uttarakhand, an interesting species was collected on young living leaves of *Medicago polymorpha*. Morphologically, this unknown fungus somewhat resembled *Deightoniella* and *Neodeightoniella* but was sufficiently distinct to warrant our proposal of it as a new genus and species.

Materials & methods

In October 2018, infected leaves of *Medicago polymorpha* were collected near Bhimtal of Nainital, Uttarakhand, during field survey, and the collected samples were kept in sterilized polythene bag for transport to the laboratory where they were processed according to standard techniques (Hawksworth 1974, Savile 1962). Slides for microscopic examination were prepared by scraping specimens from infected areas, hand sectioning, and mounted in clear lacto-phenol cotton blue mixture and clear glycerin. The microphotographs of fungal propagules were taken using Magnus MIPS CMOS camera attached to an Olympus CH20i-TR compound microscope. The detailed morphological observations and Lucida drawings were conducted at different magnifications (100×, 450×, 1000×), and 20 measurements were made of each morphological feature. The holotype specimen was deposited in the Ajrekar

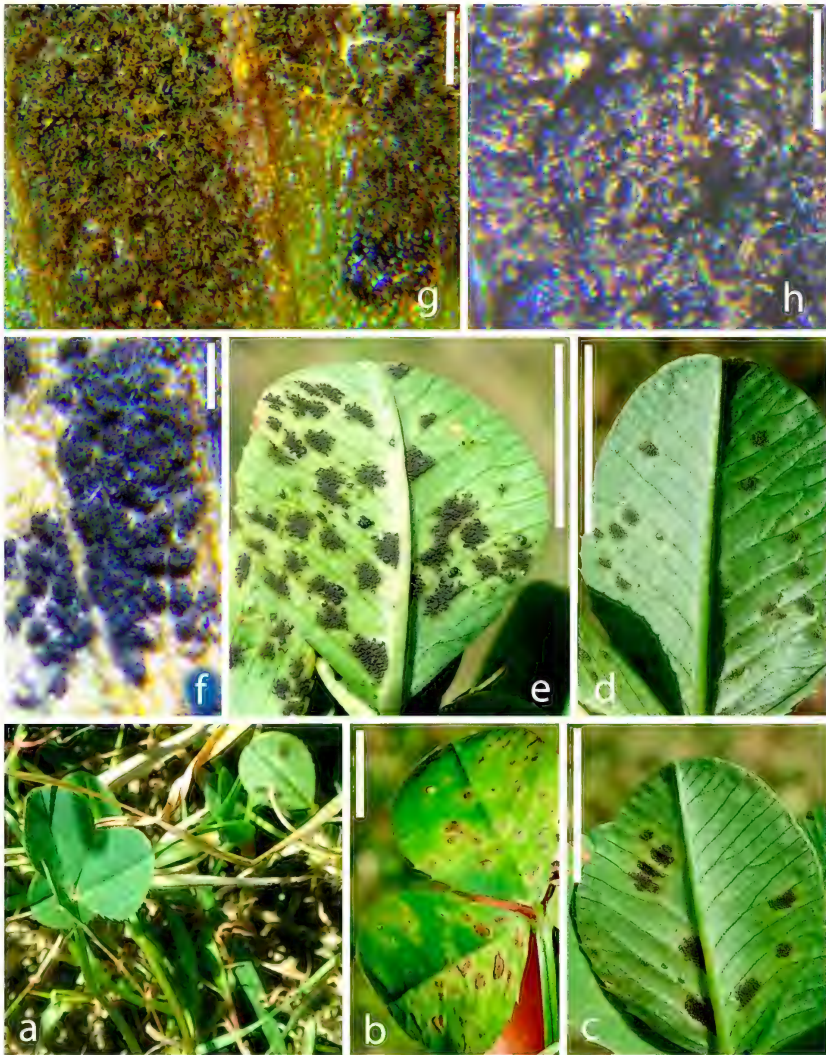


FIG. 1. *Pseudodeightoniella indica* on *Medicago polymorpha*. a. Host plant in natural habitat; b. Symptom on upper surface of leaflets; c, d. Initial stages on infection on lower surfaces of leaflets; e. Late stage of infection on lower surface of leaflet; f–h. Colonies of fungal pathogen at high magnifications. Scales bars: b–e = 5 mm; f, g = 200 μ m; h = 100 μ m.

Mycological Herbarium, Agharkar Research Institute, Pune, India (AMH), and an isotype is retained in the Mycological Herbarium of the Department of Botany, Banaras Hindi University, Varanasi, India (MH-BHU).

Taxonomy

Pseudodeightoniella S.K. Verma, Sanj. Yadav & Raghv. Singh, **gen. nov.**

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Differs from *Deightoniella* and *Neodeightoniella* by its very well-developed erumpent stromata, densely fasciculate and undulate to spiral or helicoid conidiophores with swollen basal cell, and conidia without mucoid cap.

TYPE SPECIES: *Pseudodeightoniella indica* S.K. Verma & al.

ETYMOLOGY: In reference to partial morphological similarity to the genus *Deightoniella*.

COLONIES hypophyllous, scattered, dark brown to blackish brown. MYCELIUM internal. STROMATA well-developed, prosenchymatous to pseudoparenchymatous, erumpent, mid- to dark brown. CONIDIOPHORES macronematous, densely fasciculate, arising from stromata, sub-cylindrical, straight to slightly flexuous, undulate to spiral/helicoid, unbranched, smooth to finely roughened, mid- to dark brown, septate, bearing swollen tubular or oval shaped basal cells that aggregate at the top of stromata. CONIDIOGENOUS CELLS integrated and terminal, sub-cylindrical, mid brown to dark brown, slightly lighter towards apex, finely roughened, enteroblastic, mono to polytretic; scars terminal and lateral on conidiogenous cells, thickened and darkened, slightly protruding, circular with central pore. Conidial secession schizolytic. CONIDIA solitary, mid- to dark brown, surface smooth to finely roughened, mostly obpyriform to cuneiform, slightly curved, apical cell globose, basal cell more or less funnel shaped, aseptate to septate with septum medially placed, tapering towards truncate hilum, hilum slightly thickened and dark.

Pseudodeightoniella indica S.K. Verma, Sanj. Yadav &

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FIGS 1–4

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Differs from *Deightoniella africana* by its septate conidiophores with larger basal cell and smaller conidia without any kind of conical shaped apical cell and from *Neodeightoniella phragmiticola* by its shorter, thinner conidiophores and smaller conidia lacking any mucoid cap on apical cells.

TYPE: India, Uttarakhand, Nainital, Bhimtal, 29.3919°N 79.4542°E, on living leaves of *Medicago polymorpha* L. (*Fabaceae*), 20th October 2018, coll. Sanjeet Kumar Verma (**Holotype**, AMH 10239; **isotype**, MH-BHU 19).

ETYMOLOGY: Derived from the name of country where the taxon was discovered.

INFECTION SPOTS hypogenous, brown to dark blackish brown, velvety, scattered, initially circular to subcircular but later becoming irregular, 0.2–1.1 mm in diam. COLONIES hypophyllous, scattered, dark brown to

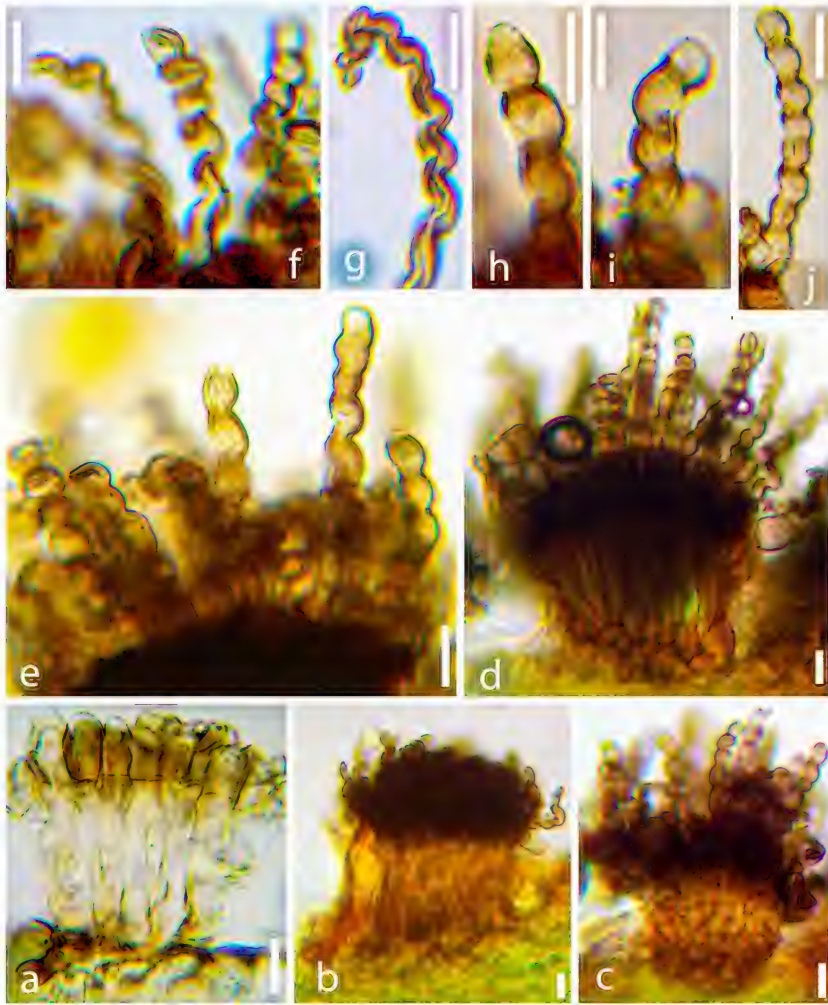


FIG. 2. *Pseudodeightoniella indica* (holotype, AMH 10239). a. Initial stage of development of stromata lined by basal swollen cells of conidiophores; b. Initial stage of development of conidiophores from swollen basal cells; c, d. Fully developed stage of undulating conidiophores in fascicle; e. Undulating nature of conidiophores; f–j. Different forms of conidiophores. Scale bars: 10 μ m.

blackish brown. MYCELIUM immersed, medium brown. STROMATA well-developed, prosenchymatous to pseudoparenchymatous, erumpent, mid brown to dark brown, 30–70 $\times$ 50–90 μ m. CONIDIOPHORES macronematous,



FIG. 3. *Pseudodeighthoniella indica* (holotype, AMH 10239). a–e. Undulating conidiophores bearing basal swollen cells (green arrow for initial stage of development of conidiophores from basal cell); f. Conidiophores with developing conidia; g–i. Enteroblastic nature of conidial ontogeny (blue arrow); j, k. Conidiogenous cells with circular loci having central pore (red arrows); l–r. Conidia. Scale bars: 10 µm.

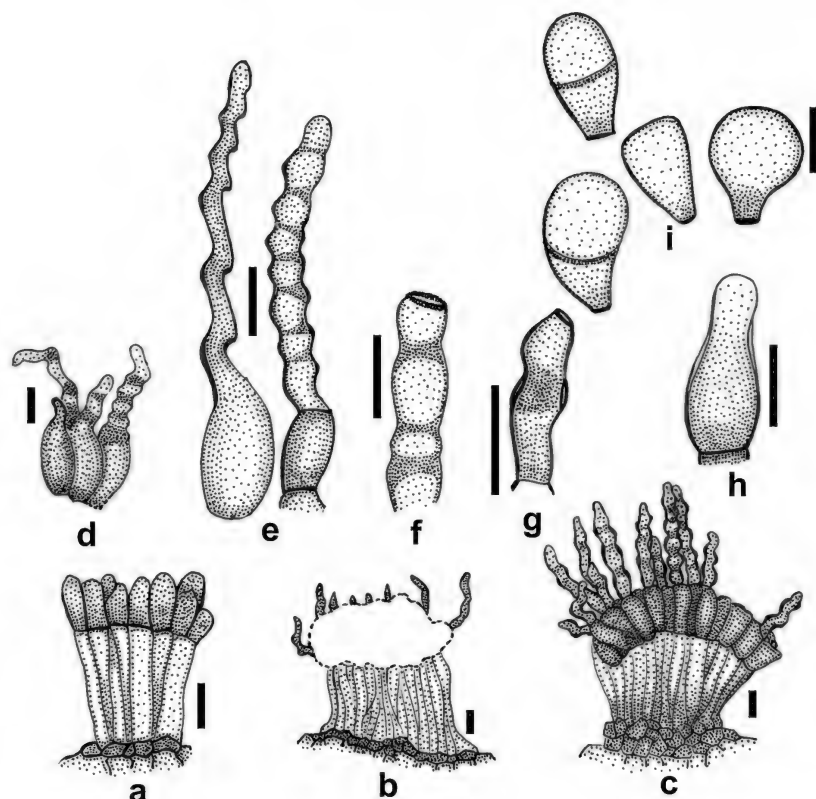


FIG. 4. *Pseudodeighthoniella indica* (holotype, AMH 10239). a. Initial stage of development of stromata lined by basal swollen cells of conidiophores; b. Initial stage of development of conidiophores from swollen basal cells; c. Developed stage of undulating conidiophores in fascicle; d. Initial developmental stage of conidiophores with basal cells; e. Different forms of developed conidiophores with basal cells; f, g. Conidiogenous cells with loci; h. Enteroblastic development of conidium; i. Conidia. Scale bars: 10 μ m.

densely fasciculate, arising from stromata, sub-cylindrical, straight to slightly flexuous, undulate to spiral/helicoid, unbranched, smooth to finely roughened, medium to dark brown, 0–2-septate, 20–50 $\times$ 2–6.5 μ m (excluding basal cells), bearing swollen tubular or oval basal cells (15–26 $\times$ 7–14 μ m) that form aggregations (70–85 $\times$ 25–40 μ m) at the tops of stromata. CONIDIOGENOUS CELLS integrated and terminal, sub-cylindrical, mid brown to dark brown, slightly lighter towards apex, finely roughened, enteroblastic, mono to polytretic, 6–16 $\times$ 3–6.5 μ m; scars terminal and lateral

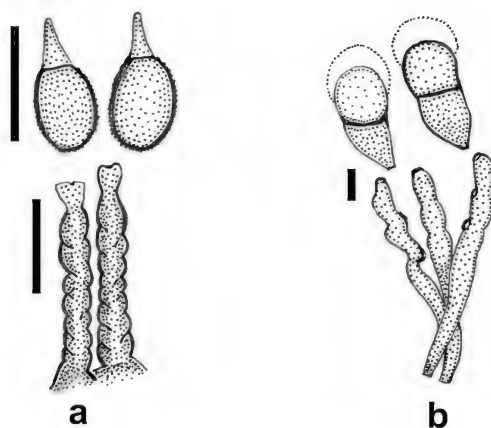


FIG. 5. *Deightoniella africana*: a. Conidia and conidiophores (Videira & al. 2017).
Neodeightoniella phragmiticola: b. Conidia and conidiophores (Crous & al. 2013).
Scale bars: 10 µm.

on conidiogenous cells, thickened and dark, slightly protruding, circular with central pore, 2.2–4.3 µm diam. Conidial secession schizolytic. CONIDIA solitary, medium to dark brown, surface smooth to finely roughened, mostly obpyriform to cuneiform, slightly curved, 13.5–18.5 × 8.5–11.5 µm, apical cell globose, basal cell more or less funnel-shaped, aseptate to 1-septate, septum medially placed, tapering towards truncate hilum, hilum slightly thickened and darkened, 2.6–4.1 µm wide.

COMMENTS—*Pseudodeightoniella* shares a superficial morphological similarity with *Deightoniella* (Hughes 1952, Klaubauf & al. 2014, Videira & al. 2017) and *Neodeightoniella* (Crous & al. 2013, Videira & al. 2017) due to the undulate nature of the conidiophores. *Deightoniella*, however, is distinguished by its lack of stromata; solitary, torsive or flexuous conidiophores; monotretic conidiogenous cells, and conidia that are transversely 1-septate above the median and with the apical cell prominently tapering towards the sub-obtuse apex; the conidiophore of *Deightoniella* shows characteristic swellings along the conidiophore length resulting from percurrent rejuvenation and conidiophore elongation (e.g., *D. africana*, FIG. 5A). *Pseudodeightoniella* is distinct from *Neodeightoniella*, which has

very poorly developed stromata (composed of only a few cells), conidia with globose apical cells bearing a prominent mucoid cap, and an absence of percurrent rejuvenation and any swollen tubular or oval shaped basal cells in the conidiophores (e.g., *N. phragmiticola*, FIG. 5B).

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